

REMARKS/ARGUMENTS

The present amendment is in response to the Office Action mailed December 3, 2003, in which Claims 7, 8, 9, 11, 12 and 27 through 32 were rejected. Applicants have thoroughly reviewed the outstanding Office Action including the Examiner's remarks and the reference cited therein. The following remarks are believed to be fully responsive to the Office Action and, when coupled with the amendments made herein, are believed to render all claims at issue patentably distinguishable over the cited references.

The specification, the title, Figures 1 and 2, and Claims 7 and 27 are amended herein. No claims are cancelled. No claims are added. Accordingly, Claims 7, 8, 9, 11, 12 and 27 through 32 remain pending.

All the changes are made for clarification and are based on the application and drawings as originally filed. It is respectfully submitted that no new matter is added.

Applicants respectfully request reconsideration in light of the above amendments and the following remarks.

SPECIFICATION OBJECTION

With respect to page 1 of the Office Action, the Examiner objected to the disclosure because the phrase "...the substrate 20 via the conductive traces 20..." was not understood.

Applicants have amended the specification herein for clarification. Reconsideration and withdrawal of the objection to the specification is respectfully requested.

NEW TITLE

With respect to page 1 of the Office Action, the Examiner stated that the title of the invention was not descriptive and that a new title was required.

Applicants have amended the title herein for clarification. Applicants respectfully submit that the title as amended is descriptive.

DRAWING OBJECTION

With respect to page 1 of the Office Action, the Examiner stated that Figures 1-2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated.

Applicants have amended Figures 1 and 2 accordingly for clarification. Reconsideration and withdrawal of the objection to the drawings is respectfully requested.

CLAIM AMENDMENTS - IN GENERAL

Independent Claims 7 and 27 have been amended herein. These are the only independent claims pending in the present application.

Particularly with respect to Claim 7, this claim has been amended for clarification to define the molding compound and the heat-spreading device as being at least partially in surface-to-surface contact with one another and as having a thermally conductive adhesive applied between the molding compound and the heat-spreading device. Both of these limitations are set forth in the application as originally filed. See, for example, lines 9 through 25 of page 7.

Particularly with respect to Claim 27, this claim has been amended for clarification to define the molding means as having heat-spreading means contact areas of which one has a flat surface and the heat-spreading means as having molding means contact areas of which one has a

flat surface, with an adhesive as being only disposed between these flat surfaces. The claim has been further amended to specify that the remainder of the contact areas are in direct contact. These limitations are also set forth in the application as originally filed. See, for example, lines 9 through 25 of page 7 as well as Figures 3 through 5f.

CLAIM REJECTIONS - 35 U.S.C. SECTION 102(b)

With respect to paragraphs 1 and 2 of the Office Action, the Examiner rejected Claims 7, 9, 11, 27, 28, 30 and 31 under 35 U.S.C. Section 102(b) as being anticipated by U.S. Patent No. 5,108,955 to Ishida *et al.* (hereinafter referred to as "Ishida *et al.*").

Applicants respectfully traverse this rejection.

Ishida *et al.* relates to a method of making a resin encapsulated pin grid array which includes an IC chip mounted on a resin substrate having a plurality of contact pins on its lower surface and resin-encapsulated by injection molding. However, there is no use of glue or adhesive in the pin grid array of that reference. In fact, Ishida *et al.* state **unequivocally** that the use of glue is **undesirable** in their analysis of the prior art:

"Of these conventional techniques, the heat radiating structure shown in FIG. 1 in which the metal cap 5 is adhered on or pushed in the encapsulating resin 6 has the following drawback. That is, the heat radiation property toward the upper surface obtained by the metal cap 5 depends on an adhesion strength between the surface of the encapsulating resin 6 and the inner surface of the metal cap 5. However, if the metal cap 5 is adhered on or pushed in the encapsulating resin 6 as described above, the adhesion strength changes in accordance with the surface precisions of the inner surface of the metal cap 5 and the surface of the encapsulating resin 6 or variations in amount of an adhesive and the like. As a result, a uniform heat radiation property cannot be obtained." (Col. 2, lines 52-66)

A similar statement is made in col. 2, lines 67 and 68, carrying over to col. 3, lines 1 through 7.

According to the present invention, a thermally conductive glue 48 is applied to "the

concave of the molding compound 30" (page 7, lines 19-20). As illustrated in Figure 4, the glue 48 is applied between the flat surface of the concave area of the compound 30 and the flat surface of the bump 31 of the heat-spreading device 32. Other than these two opposed flat surfaces, the glue 48 is no-where else applied. Instead, the remaining opposing contact surfaces between the heat-spreading device 32 and the compound 30 are flush, that is, there is direct contact thus providing maximum heat dissipation.

Independent Claims 7 and 27 have been amended for clarification to reflect these distinctions. In view of the limitations now present in amended independent Claims 7 and 27, it cannot now be said that the patent to Ishida *et al.* anticipates these claims, and thus are allowable over Ishida *et al.* As to the other claims rejected under 35 U.S.C. Section 102(b), these claims are dependent upon Claims 7 or 27, either directly or indirectly, and likewise it cannot now be said that the patent to Ishida *et al.* anticipates these claims.

Reconsideration and withdrawal of the rejections under 35 U.S.C. Section 102(b) are respectfully requested.

CLAIM REJECTIONS - 35 U.S.C. SECTION 103(a)

With respect to paragraphs 3 and 4 of the Office Action, the Examiner rejected Claims 8, 12, 29 and 32 under 35 U.S.C. Section 103(a) as being unpatentable over Ishida *et al.* in view of U.S. Patent No. 6,146,921 to Barrow (hereinafter referred to as "Barrow").

Applicants respectfully traverse this rejection.

Referring to Barrow, "*the package may include an adhesive 30 that attaches the thermal element 26 to the housing 22 and/or integrated circuit*" (col. 2, lines 51-53). In addition, "[t]he adhesive 30 can be applied to the entire interface between the thermal element 26 and housing

22 and/or the interface between the thermal element 26 and housing 22 and/or the interface between the thermal element 26 and the integrated circuit 12" (col. 2, lines 56-61).

However, and referring to the figures, there is no direct contact between the thermal element 26 and the housing 22. While some adhesive appears to be is shown as used in Figure 1 as adhesive 30, there is no direct contact between these elements. This arrangement must not be very good for thermal dissipation, even if adhesive 30 is applied to the entire interface as suggested in the specification. Barrow could not be very effective at heat dissipation, and certainly would not be as effective as the design of the instant application.

It is clear, then, that (1), Barrow uses only adhesive and has no surface-to-surface contact between the thermal element 26 and the housing 22 and, (2), Ishida teaches surface-to-surface contact *but specifically teaches away from the use of adhesives between these surfaces*. Instead, Ishida *et al.* use a different approach to improving heat dissipation:

"In order to improve a heat radiation property, the injection-molded resin 6 must be integrally molded with the heat radiating plate 7 not through an adhesive layer." (Col. 4, lines 29-33)

Accordingly, Applicants respectfully submit that the proposed combination of Ishida *et al.* and Barrow would not result in the invention as presently claimed in independent Claims 7 and 27, those claims upon which the claims rejected under 35 U.S.C. Section 103(a) depend. In fact, Ishida *et al.* teach *away* from the use of adhesives anywhere, and thus the combination of this reference with that of Barrow could not be said to render Claims 8, 12, 29, or 32 unpatentable.

Reconsideration and withdrawal of the rejections under 35 U.S.C. Section 103(a) are respectfully requested.

CONCLUSION

In light of the above amendments and remarks, Applicants respectfully submit that all pending Claims 7, 8, 9, 11, 12 and 27 through 32 as currently presented are in condition for allowance. If, for any reason, the Examiner disagrees, please call the undersigned attorney at 248-433-7552 in an effort to resolve any matter still outstanding *before* issuing another action. The undersigned attorney is confident that any issue which might remain can readily be worked out by telephone.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,



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